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CUSTOMER NO. 24498
Serial No.: 10/566,876
Notice of Appeal filed: 10/27/09
Appeal Brief dated: 12/22/09

PATENT
PU030189

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

Applicants	:	Louis Robert Litwin, Jr. et al.
Application No.:		10/566,876
Filed	:	February 2, 2006
For	:	FREQUENCY SYNCHRONIZATION DURING CELL SEARCH IN A UNIVERSAL MOBILE TELEPHONE SYSTEM RECEIVER
Examiner	:	Ariel A. Balaoing
Art Unit	:	2617

APPEAL BRIEF

Mail Stop: Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

May It Please The Honorable Board:

Applicants appeal from the FINAL Office Action dated April 28, 2009, and the Advisory Action dated June 5, 2009, in which claims 1-14 of the above-identified application stand rejected.

Applicant waives an Oral Hearing for this appeal.

Please charge the $540.00 fee for filing this Brief to Deposit Account No. 07-0832.

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I. REAL PARTY IN INTEREST

The real party in interest of Application No. 10/566,876 is:

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France.

II. RELATED APPEALS AND INTERFERENCES

There are no related Appeals or Interferences.

III. STATUS OF THE CLAIMS

Claims 1-14 are pending in this application.

Claims 1-14 have been rejected.

The rejection of claims 1-14 are appealed.

IV. STATUS OF AMENDMENTS

In response to the FINAL Office Action dated April 28, 2009, and the Advisory Action dated June 5, 2009, Applicants' representative filed a Notice of Appeal on October 27, 2009.

This appeal is directed to the claims as they stood at the time of the FINAL Office Action dated April 28, 2009, and the Advisory Action dated June 5, 2009, and which are shown in the Claims Appendix of this Brief.

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V. SUMMARY OF CLAIMED SUBJECT MATTER

There are three independent claims pending in the application: 1, 6 and 10.

As noted in the background of Applicants' specification, when a cell phone turns on, the cell phone searches for a base station, or cell, to communicate with. (Applicants' specification, p. 1, lns. 10-14.) This "cell search" process involves performing the following steps: "slot synchronization", "frame synchronization" and "determining the scrambling code group". (Applicants' specification, p. 1, lns. 14-18.) However, Applicants also noted that frequency synchronization (removal of frequency offsets between a transmitter and a receiver) occurs after the cell search has been performed. (Applicants' specification, p. 2, lns. 10-16.) Unfortunately, any frequency offsets can degrade the performance of the cell search process. (Applicants' specification, p. 2, lns. 16-24.)

In this regard, Applicants' inventive concept recognizes that the slot synchronization of the cell search process can be used to adjust for frequency offset. Thus, the affect of frequency offset on the cell search process is reduced, if not eliminated. (Applicants' specification, p. 2, lns. 26-32.)

In view of the above, Applicants' independent claim 1 is directed to a method for receiving a wireless signal (e.g., signal 111 of FIG. 3), processing a first synchronization channel of the received wireless signal to acquire slot synchronization (e.g., step 305 of FIG. 4) and processing a second synchronization channel of the received wireless signal to acquire frame synchronization in such a way that the first synchronization channel is used to adjust for a frequency offset (e.g., step 310 of FIG. 4). (Applicants' specification, p. 5, ln. 11 to p. 6, ln. 11.)

Applicants' independent claim 6 is similar to Applicants' independent claim 1, and is directed to a method for acquiring slot synchronization from a primary synchronization signal of a received wireless signal (e.g., step 305 of FIG. 4); and after acquiring slot synchronization, using the primary synchronization signal to adjust for a frequency offset while acquiring frame synchronization from a secondary synchronization signal of the received wireless signal (e.g., step 310 of FIG. 4). (Applicants' specification, p. 5, ln. 11 to p. 6, ln. 11.)

Finally, Applicants' independent claim 10 is an apparatus claim directed to a front end for receiving a wireless signal and for providing a stream of received samples (e.g., front end 105 of FIG. 2); a primary synchronization element operative on the received

samples for acquiring slot synchronization to a primary synchronization signal of the received wireless signal and for further processing the primary synchronization signal subsequent to slot synchronization for estimating frequency offset (e.g., PSCH element 205 of FIG. 3); a secondary synchronization element operative on the received samples for acquiring frame synchronization to a secondary synchronization signal of the received wireless signal (e.g., SSCH 210 of FIG. 3); and a processor, responsive to the further processing of the primary synchronization signal by the primary synchronization element, to adjust for a frequency offset in the wireless equipment during operation of the secondary synchronization element (e.g., processor 135 of FIG. 2; also note signals 206, 216 and 211 to/from processor 135 shown on FIG. 3). (Applicants' specification, p. 4, ln. 19 to p. 7, ln. 3.)

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

There are two grounds of rejection to be reviewed on Appeal.

(1) Whether claims 1-5 are unpatentable under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication 2003/0043768 published March 6, 2003 for Chang et al. (*Chang*).

(2) Whether claims 6-14 are unpatentable under 35 U.S.C. §103(a) over *Chang* in view of U.S. Patent No. 6,560,298 issued May 6, 2003 to Froehling et al. (*Froehling*).

VII. ARGUMENT

Rejection of Claims 1-5 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Publication 2003/0043768 published March 6, 2003 for Chang et al. (*Chang*).

CLAIMS 1-5

The Examiner's rejection of claims 1-5 under 35 U.S.C. §102(e) as being anticipated by *Chang* is simply wrong.

Applicants' dependent claims 2-5 stand or fall with Applicants' independent claim 1.

CLAIMS 1-5 ARE PATENTABLE

Applicants' independent claim 1 is not anticipated by *Chang*. For convenience, Applicants' claim 1 states (emphasis added):

> "1. (Previously presented) A method for use in a wireless receiver, comprising:
>
> 'receiving a wireless signal;
>
> 'processing a first synchronization channel of the received wireless signal to acquire slot synchronization; and
>
> 'processing a second synchronization channel of the received wireless signal to acquire frame synchronization **in such a way that the first synchronization channel is used** to adjust for a frequency offset."

It should be noted that Applicants' claim 1 requires processing a second synchronization channel to acquire frame synchronization **in such a way that the first synchronization channel is used** to adjust for a frequency offset (e.g., see step 310 of FIG. 4 of Applicants' specification). In other words, the plain language of Applicants' claim 1 requires that the first synchronization channel be used to adjust for a frequency offset while processing the second synchronization channel **to acquire frame synchronization**. This is simply not described or suggested by *Chang*.

Chang is clear. The frequency offset estimation is a result of the Phase IV verification, e.g., see signal 353 in Figure 3 of *Chang*. Indeed,

> "[i]n order to reduce errors caused by the difference in frequency between the transmitted signal and a local reference, the Phase IV verification circuit 350 performs a frequency correction, the result of which is a coarse frequency offset estimation signal on line 353."
>
> *Chang*, paragraph 041, p. 3, emphasis added.

Thus, the frequency correction described and shown in *Chang* is not performed till after acquisition of frame synchronization. This is clearly shown in FIG. 3 of *Chang*, shown below.

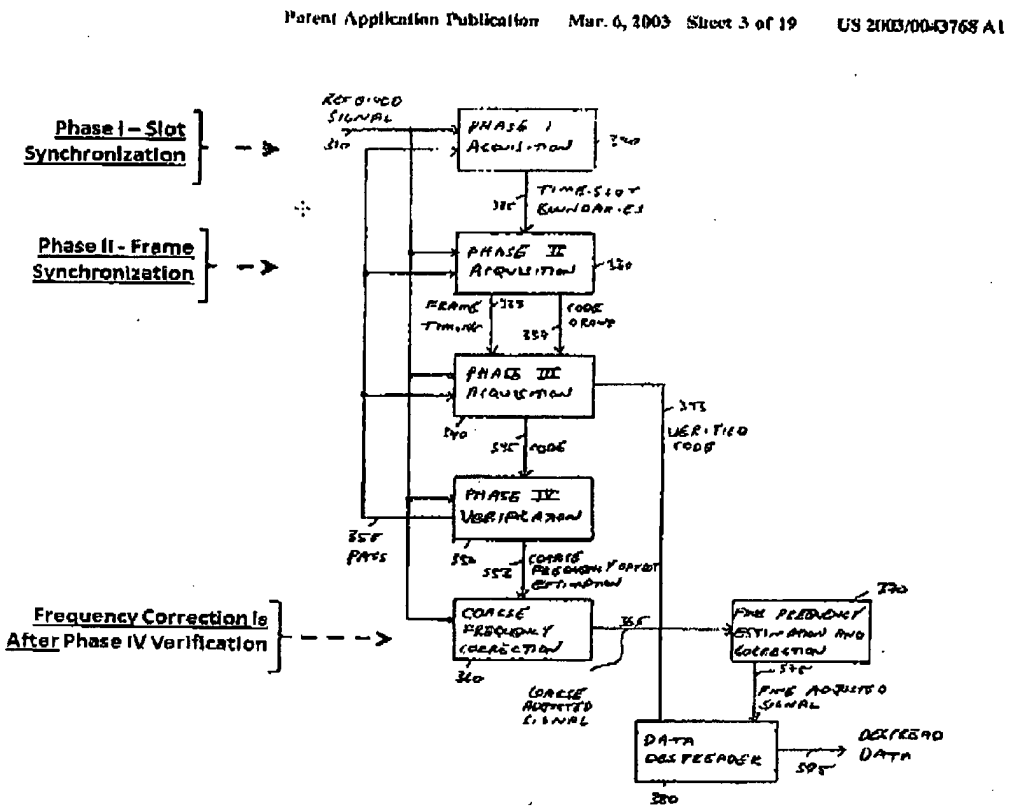

FIG. 3 of *Chang* (dashed-arrow annotations added.)

First, element 320 of FIG. 3, of *Chang*, acquires slot synchronization in Phase I. (*Chang*, paragraph [0037].) Second, element 330 of FIG. 3, of *Chang*, acquires frame synchronization in Phase II (*Chang*, paragraph [0038]). As clearly observable from the

dashed arrow annotations of FIG. 3, of *Chang*, coarse frequency correction element 360 is after the phase IV verification – let alone after frame synchronization in phase II (element 330). Thus, it is simply not possible for *Chang* to describe, or suggest, processing a second synchronization channel to acquire frame synchronization **in such a way that the first synchronization channel is used** to adjust for a frequency offset as required by Applicants' claim 1. *Chang* simply does not describe, or suggest, that during Phase II acquisition the first synchronization channel is used to adjust for a frequency offset. Indeed, in *Chang*, the frequency offset estimation is a result of the Phase IV verification, e.g., see signal 353 in Figure 3 of *Chang*. This is clearly different from the requirements of Applicants' claim 1.

As such, the Examiner's statement on p.4 of the Final Office Action, dated 4/28/09, that the "frequency offset is compensated for within the VCO using primary and secondary channels" simply has nothing to do with the requirements of Applicants' claim 1.

Further, the Examiner's comment on p.3 of the Advisory Action dated 6/5/09 that the phrase "in such a way" "allows processing of a second synchronization channel at any time while using a first synchronization channel [used] to adjust for a frequency offset" – ignores the plain meaning of Applicants' claim 1. As noted above, Applicants' claim 1 clearly requires acquiring frame synchronization **in such a way that the first synchronization channel is used** to adjust for a frequency offset. Thus, Applicants' claim 1 clearly acquiring frame synchronization while using the first synchronization channel to adjust for a frequency offset. As noted above, *Chang* simply does not describe, or suggest, that during Phase II acquisition the first synchronization channel is used to adjust for a frequency offset. Indeed, in *Chang*, the frequency offset estimation is performed after frame synchronization – in the Phase IV verification, e.g., see signal 353 in Figure 3 of *Chang*. Again, this is clearly different from the requirements of Applicants' claim 1.

In view of the above, *Chang* simply does not describe or suggest Applicants' claimed requirement of "processing a second synchronization channel of the received wireless signal to acquire frame synchronization **in such a way that the first synchronization channel is** used to adjust for a frequency offset" as required by claim 1.

In view of the above, Applicants' claim 1, and, therefore, dependant claims 2-5 are patentable over *Chang*.

Rejection of Claims 6-14 under 35 U.S.C. §103(a) as being unpatentable over *Chang* in view of U.S. Patent No. 6,560,298 issued May 6, 2003 to Froehling et al. (*Froehling*).

CLAIMS 6-14

The Examiner's rejection of claims 6-14 under 35 U.S.C. §103(a) as being unpatentable over *Chang* in view of *Froehling* fails for the same reasons as described above with respect to Applicants' claim 1 and as described further below.

Applicants' dependent claims 7, 8, 9, stand or fall with Applicants' independent claim 6.

Applicants' dependent claims 11, 12, 13 and 14 stand or fall with Applicants' independent claim 10.

CLAIMS 6-9 ARE PATENTABLE

Applicants' independent claim 6 is patentable over *Chang* in view of *Froehling*. In particular, Applicants' independent claim 6 requires in part:

> "after acquiring slot synchronization, using the primary synchronization signal **to adjust for a frequency offset** while acquiring frame synchronization from a secondary synchronization signal of the received wireless signal."

The combination of *Chang* and *Froehling* does not describe, or suggest, Applicants' claimed invention. As noted earlier, nowhere does *Chang* describe or suggest using the primary synchronization signal **to adjust for a frequency offset** while acquiring frame synchronization from a secondary synchronization signal of the received wireless signal as required by Applicants' independent claim 6. In *Chang*, frame acquisition is performed in Phase II and frequency synchronization occurs later in Phase IV. (*Chang*, FIG. 3.) Thus, as described in *Chang*, during Phase II (frame synchronization) no adjusting for a frequency offset occurs.

Nor is this deficiency remedied by *Froehling*. Simply put, nowhere does *Froehling* even describe using slot synchronization for estimating frequency offset. In fact, the word "slot" only occurs twice in *Froehling* at col. 2, ln. 39, and col. 6, ln. 32. Indeed, the technique described in *Froehling* is different. In particular, *Froehling* describes the identification of frame synchronization words and their offsets for adjusting

the frequency offset. (*Froehling*, FIG. 3, col. 6, lns. 39-63.) In particular, *Froehling* states:

> "The alias case selector 214 determines which unique word or alias correlated to a segment of data stream 210 and outputs the corresponding phase shift (alias error) present in the data stream 210, indicating which of the unique words and associated aliases of the unique words provided the found correlation, to the data re-mapper 218 (and also to the composite error estimator 216) which is coupled to the alias case selector 214."
>
> ...
>
> "Given that all digital radio receivers need a unique word or words for frame synchronization, the properties of the unique words and their associated aliases were studied to determine if any false correlations could occur."

Froehling, col. 6, lns. 39-46; and lns. 60-63; emphasis added.

Thus, it can be seen from the above, that *Froehling* uses frame synchronization itself to adjust for frequency offset by examining the frame synchronization words and their possible offsets for determining the frequency offset. Indeed, *Froehling* teaches away from Applicants' claimed invention, as *Froehling* adjusts for a frequency offset using frame synchronization. Thus, *Froehling* does not even suggest using slot synchronization for estimating frequency offset as claimed by Applicants. As such, the combination of *Chang* and *Froehling* does not describe, or suggest, Applicants' claimed invention directed to using slot synchronization.

In view of the above, Applicants' independent claim 6, and, therefore, dependant claims 7-9, are patentable over *Chang* in view of *Froehling*.

CLAIMS 10-14 ARE PATENTABLE

Applicants' independent claim 10 is patentable over *Chang* in view of *Froehling*. In particular, Applicants' independent claim 10 requires in part:

> "...processing the primary synchronization signal subsequent to slot synchronization for estimating frequency offset; and

> 'a processor, responsive to the further processing of the primary synchronization signal by the primary synchronization element, to adjust for a frequency offset in the wireless equipment **during operation** of the secondary synchronization element [for acquiring frame synchronization]."

Again, the combination of *Chang* and *Froehling* does not describe, or suggest, Applicants' claimed invention. As noted earlier, nowhere does *Chang* describe or suggest using the primary synchronization signal **to adjust for a frequency offset** while acquiring frame synchronization from a secondary synchronization signal of the received wireless signal as required by Applicants' independent claim 10. In *Chang*, frame acquisition is performed in Phase II and frequency synchronization occurs later in Phase IV. (*Chang*, FIG. 3.) Thus, as described in *Chang*, during Phase II (frame synchronization) no adjusting for a frequency offset occurs.

Further, and as stated earlier, this deficiency is not remedied by *Froehling*. Simply put, nowhere does *Froehling* ev en describe using slot synchronization for estimating frequency offset. In fact, the word "slot" only occurs twice in *Froehling* at col. 2, ln. 39, and col. 6, ln. 32. Indeed, the technique described in *Froehling* is different. In particular, *Froehling* describes the identification of frame synchronization words and their offsets for adjusting the frequency offset. (*Froehling*, FIG. 3, col. 6, lns. 39-63.) In particular, *Froehling* states:

> "The alias case selector 214 determines which unique word or alias correlated to a segment of data stream 210 and outputs the corresponding phase shift (alias error) present in the data stream 210, indicating which of the unique words and associated aliases of the unique words provided the found correlation, to the data re-mapper 218 (and also to the composite error estimator 216) which is coupled to the alias case selector 214."
>
> ....
>
> "Given that all digital radio receivers need a unique word or words for frame synchronization, the properties of the unique words and their associated aliases were studied to determine if any false correlations could occur."
>
> *Froehling*, col. 6, lns. 39-46; and lns. 60-63; emphasis added.

Thus, it can be seen from the above, that *Froehling* uses frame synchronization itself to adjust for frequency offset by examining the frame synchronization words and their possible offsets for determining the frequency offset. Indeed, it should again be noted that *Froehling* teaches away from Applicants' claimed invention, as *Froehling* adjusts for a frequency offset using frame synchronization. Thus, *Froehling* does not even suggest using slot synchronization for estimating frequency offset as claimed by Applicants. As such, the combination of *Chang* and *Froehling* does not describe, or suggest, Applicants' claimed invention directed to using slot synchronization.

In view of the above, Applicants' independent claim 10, and, therefore, dependant claims 11-14, are patentable over *Chang* in view of *Froehling*.

VIII. CONCLUSION

For the above reasons, Applicants submit that claims 1-14 are patentable. It is therefore respectfully requested that:

- the rejection of claims 1-5 under 35 U.S.C. § 102(e); and
- the rejection of claims 6-14 under 35 U.S.C. § 103(a);

all be reversed.

Respectfully submitted,
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IX. CLAIMS APPENDIX

1. (Previously presented) A method for use in a wireless receiver, comprising:

receiving a wireless signal;

processing a first synchronization channel of the received wireless signal to acquire slot synchronization; and

processing a second synchronization channel of the received wireless signal to acquire frame synchronization in such a way that the first synchronization channel is used to adjust for a frequency offset.

2. (Original) The method of claim 1, wherein the first synchronization channel is a primary synchronization subchannel (PSCH) and the second synchronization channel is a secondary synchronization subchannel (SSCH) of a universal mobile telephone system (UMTS).

3. (Original) The method of claim 1, wherein the step of processing a second synchronization channel includes the steps of:

processing the first synchronization channel to estimate a frequency offset in the received wireless signal; and

adjusting a clock of the wireless receiver to compensate for the estimated frequency offset.

4. (Original) The method of claim 3, wherein the step of processing the first synchronization channel to estimate a frequency offset includes:

rotating signals associated with the first synchronization channel through a plurality of frequency offsets;

determining a corresponding plurality of correlation peaks for each of the rotated signals at each of the plurality of frequency offsets;

selecting at least one of the plurality of correlation peaks such that a magnitude of the selected correlation peak is at least as large as magnitudes of the remaining plurality of correlation peaks; and

using at least the corresponding one of the plurality of frequency offsets associated with the selected correlation peak as the estimated frequency offset.

5. (Original) The method of claim 1, wherein the step of processing a second synchronization channel includes the steps of:

processing the first synchronization channel to provide a coarse estimate of the frequency offset in the received wireless signal;

processing the first synchronization channel to further refine the coarse estimate of the frequency offset to provide a final estimate of frequency offset; and

adjusting a clock of the wireless receiver to compensate for the final estimate of the frequency offset.

6. (Original) A method for use in a Universal Mobile Telephone System (UMTS) based wireless receiver, comprising:

acquiring slot synchronization from a primary synchronization signal of a received wireless signal; and

after acquiring slot synchronization, using the primary synchronization signal to adjust for a frequency offset while acquiring frame synchronization from a secondary synchronization signal of the received wireless signal.

7. (Original) The method of claim 6, wherein the step of using the primary synchronization signal includes the steps of:

processing the primary synchronization signal to estimate a frequency offset in the received wireless signal; and

adjusting a clock of the wireless receiver to compensate for the estimated frequency offset.

8. (Original) The method of claim 7, wherein the step of processing the primary synchronization signal to estimate a frequency offset includes:

rotating signals associated with the primary synchronization signal through a plurality of frequency offsets;

determining a corresponding plurality of correlation peaks for each of the rotated signals at each of the plurality of frequency offsets;

selecting at least one of the plurality of correlation peaks such that a magnitude of the selected correlation peak is at least as large as magnitudes of the remaining plurality of correlation peaks; and

using at least the corresponding one of the plurality of frequency offsets associated with the selected correlation peak as the estimated frequency offset.

9. (Original) The method of claim 6, wherein the step of using the primary synchronization signal includes the steps of:

processing the primary synchronization signal to provide a coarse estimate of the frequency offset in the received wireless signal;

processing the primary synchronization signal to further refine the coarse estimate of the frequency offset to provide a final estimate of the frequency offset; and

adjusting a clock of the wireless receiver to compensate for the final estimate of the frequency offset.

10. (Previously presented) Wireless equipment comprising:

a front end for receiving a wireless signal and for providing a stream of received samples;

a primary synchronization element operative on the received samples for acquiring slot synchronization to a primary synchronization signal of the received wireless signal and for further processing the primary synchronization signal subsequent to slot synchronization for estimating frequency offset;

a secondary synchronization element operative on the received samples for acquiring frame synchronization to a secondary synchronization signal of the received wireless signal; and

a processor, responsive to the further processing of the primary synchronization signal by the primary synchronization element, to adjust for a frequency offset in the wireless equipment during operation of the secondary synchronization element.

11. (Original) The wireless equipment of claim 10, wherein, subsequent to slot synchronization, the primary synchronization element continues to process the primary synchronization signal of the received wireless signal simultaneously with processing of the received wireless signal by the secondary synchronization element.

12. (Original) The wireless equipment of claim 10, wherein the primary synchronization element determines an estimate of the frequency offset in the received wireless signal and the processor adjusts a clock of the wireless equipment to compensate for the estimated frequency offset.

13. (Previously presented) The wireless equipment of claim 10, further including a rotator for rotating the received samples while the secondary synchronization element is acquiring frame synchronization and for applying the rotated received samples to the primary synchronization element, which processes the primary synchronization signal represented therein.

14. (Original) The wireless equipment of claim 13, wherein the processor selects a rotation value of the rotator for use as the estimated frequency offset.

X. EVIDENCE APPENDIX (NONE)

None.

XI. RELATED PROCEEDINGS APPENDIX (NONE)

None.